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EXAMINER

LEUNG, JENNIFER A

ART UNIT PAPER NUMBER

1764

DATE MAILED: 11/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/829,992

Applicant(s)

SUZUKI ET AL.

Examiner

Jennifer A. Leung

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 September 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) 9-14 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5, 6 and 8 is/are rejected.
- 7) ☒ Claim(s) 4 and 7 is/are objected to.
- 8) ☒ Claim(s) 1-14 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 April 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of claims 1-8 in the reply filed September 28, 2004 is acknowledged. Claims 9-14 are withdrawn from consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings and Specification

3. The drawings and specification have not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 5 and 8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention, because "*the powdery* hydrogen absorption material" lacks proper positive antecedent basis.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Nakane et al. (US 4,270,360).

Nakane et al. (FIG. 1, 2 and 5; column 3, line 21 to column 6, line 33; column 7, lines 36-61) discloses an apparatus comprising:

an outer cylinder (i.e., a drum or cylindrical container, not labeled; column 3, lines 22-34); and at least one cylindrical hydrogen storage module (i.e., comprising elements **5, 6, 10, 11**)

positioned within the outer cylinder, the hydrogen storage module inherently having an outer diameter smaller than an inner diameter of the outer cylinder (i.e., the module must be able to fit inside the drum or cylinder, and would therefore have an outer diameter smaller than the inner diameter of its container), wherein a hydrogen passage is formed between an inner peripheral surface of the outer cylinder and the hydrogen storage module (see FIG. 5, wherein a plurality of hydrogen feed/discharge passages to the modules are shown located within the confines of the container, in fluid communication with pipe **4**);

each cylindrical hydrogen storage module comprising:

a laminate including a plurality of adjacent hydrogen storage units filled with hydrogen absorption materials (i.e., each unit comprising a pair of hydrogen-storage alloy filled spaces **10** and **11**), the laminate having a hydrogen absorption and desorption surface on at least a part of the outer peripheral surface of the laminate (see FIG. 2, for outer peripheral surfaces of alloy located in spaces **10, 11**);

at least one heating/cooling element (i.e., heating/cooling members **5**, **6**, column 4, lines 2-31) positioned between adjacent ones of the hydrogen storage units **10/11**;

at least one main passage that passes through the laminate in a lamination direction of the hydrogen storage units **10/11** parallel to a longitudinal axis of the outer cylinder (as shown in FIG. 5, from left to right), wherein heating fluid and cooling fluid pass through the at least one main passage (i.e., the portion of passages **8/9**, for flowing fluid from left to right; FIG. 5); and

sub passages that branch from the at least one main passage in a direction perpendicular to the longitudinal axis (as shown in FIG. 5, from top to bottom) and extend over within each of the heating/cooling elements **5**, **6** (i.e., the portion of passages **8/9**, for flowing fluid from top to bottom; FIG. 5).

Instant claim 1 structurally reads on the apparatus of Nakane.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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6. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakane et al. (US 4,270,360) in view of Maruhashi et al. (JP 11-211267).

Nakane et al. is silent as to the sub passages (i.e., the portion of passages 8/9, for flowing fluid from top to bottom, through heating/cooling members 5 and 6; FIG. 1, 2, 5) comprising a plurality of guide members that circulate the heating fluid and cooling fluid throughout the sub passages. Maruhashi et al. teaches an apparatus comprising a plurality of containers S containing a hydrogen absorption material LM, MM, HM (section [0024]; FIG. 6, 10), wherein each container S further comprises a heating/cooling element, as defined by a plurality of heat transfer passages 9a located between the inner surface of dividers 9 and the outer surface of containers S (section [0030]; FIG. 4). In particular, the passages 9a comprise a plurality of guide members (i.e., as defined by punch metal PM, having slots PM1; FIG. 1, 4), thereby creating a tortuous and uneven path for the heat transfer medium as it flow through passages 9a. It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide a plurality of guide members to the sub passages in the apparatus of Nakane et al., because the tortuous and uneven path created by the guide members would cause the heat transfer medium to flow turbulently over the heat transfer surface, thereby enhancing the heat exchange efficiency between the heat transfer medium and the hydrogen absorption material, as taught by Maruhashi et al. (see Abstract). Furthermore, the guide members would increase the surface area of the flow passages, which also improves heat exchange efficiency.

7. Claims 3 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakane et al. (US 4,270,360) in view of Maruhashi et al. (JP 11-211267), as applied to claim 2 above, and further in view of Stetson et al. (US 6,099,811).

The collective teachings of Nakane et al. and Maruhashi et al. are silent as to the heating fluid comprising hydrogen and oxygen, wherein the heating/cooling elements include a catalyst that facilitates a burning reaction of the hydrogen with the oxygen. Instead, Nakane et al. (column 4, lines 15-26) discloses,

“For the purpose of heating and cooling, gaseous or liquid media may be used... As the heating medium, an effluent liquid or exhaust gas of varying temperature (of not more than 100 °C) may be used. As the cooling medium, waste water or plain air of room temperature or a lower temperature may be used.”

However,

“The temperatures of the heating and cooling media which are to be actually used are determined by the characteristics of hydrogen occlusion and release exhibited by the hydrogen-storage alloy.”

Suitable alloys include binary, ternary or quaternary alloys of magnesium, titanium or a rare earth metal as its principal component, wherein each alloy characteristically occludes hydrogen at its own optimum temperature under optimum hydrogen pressure, (column 2, lines 53-66).

Stetson et al. teaches an apparatus (FIG. 1) comprising a container **5** containing a hydrogen absorption material **40**, wherein the material **40** comprises a “high-temperature” storage material, especially a magnesium-based alloy, characterized in that the storage material will have a 1-atmosphere equilibrium plateau pressure at temperatures at or above 100 °C (column 4, lines 28-43). The apparatus further comprises a heating element that utilizes a catalyst **34** (column 5, lines 32-40) for facilitating a burning reaction of hydrogen (supplied through inlet port **31**) and oxygen (supplied through inlet port **37**).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to include a catalyst for facilitating the burning reaction of hydrogen and oxygen in the

heating/cooling element of the modified apparatus of Nakane et al., on the basis of suitability for the intended use (i.e., depending on a selected alloy) and absent showing any unexpected results thereof, because the catalytic burning of hydrogen and oxygen would generate the high temperatures and heat of desorption optimally required of "high-temperature" hydrogen absorption materials, which temperature and heat often cannot be provided by most hydrogen-use applications, as taught by Stetson et al. (column 3, lines 40-59).

Allowable Subject Matter

8. Claims 4 and 7 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claims 5 and 8 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Ovshinsky et al., Asami et al., Billings, Nishizaki et al., Rockenfeller, Teitel, Yasunaga et al. and Mackay are presented to further illustrate the state of the art.

* * *

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is (571) 272-1449. The examiner can normally be reached on 8:30 am - 5:30 pm M-F, every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on (571) 272-1444. The fax phone number for

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the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jennifer Leung
November 8, 2004 *JP*



HIEN TRAN
PRIMARY EXAMINER